

REVISION OF THE HAWAIIAN DIOPYROS (EBENACEAE)

HAWAIIAN PLANT STUDIES 120

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In the flora of any considerable area, one expects to find several genera that are technically difficult of classification. Such a one in Hawaii is Diospyros.

Earlier botanists accepted the species with trimerous flowers as in the genus Maba, these differing from Diospyros which had the flowers 2-, 4-, or 5-merous. This basis of separation is now considered arbitrary, and hence the two genera are merged as Diospyros. Maba sandwicensis A. DC. (1844) was based on a collection by Gaudichaud from the Sandwich Islands. M. Hillebrandii Seem. (1866) was described from a plant of Oahu, based on Hillebrand 274, in the Kew Herbarium. For several decades these two species formed the concept of the genus in Hawaii, the trees called "lama" by the Hawaiians.

R. C. Bakhuizen van den Brink (1935-1955) monographed the group as Diospyros, covering the species of Malaysia, southern Asia, and the Pacific. In it he accepted D. ferrea (Willd.) Bakh. of southern India, and under it he had 52 varieties or forms, occurring from Madagascar to Hawaii. Fosberg (1939) accepted Bakhuizen's concept of D. ferrea, but recognized that in the Hawaiian Islands it contained diverse kinds, and he classified them as five varieties and eight forms. His key to them has not proven practical. Consequently the author has reexamined them, and has produced the present treatment.

Recent monographic study was by Kostermans (1977) and he stated (p. 449), "The greatest headache was Bakhuizen's treatment of Diospyros ferrea, in which he has lumped so many species, than nobody could make head or tail of it any more." Consequently D. sandwicensis is restored to specific rank. Of Fosberg's minor taxa, nine are accepted, but two are reduced to synonymy. In addition to them the author here described eight new ones. Thus, D. sandwicensis is recognized as a species with numerous variations, and is a group difficult to classify. On the other hand, D. Hillebrandii remains as a single, clear unit.

Key to the Hawaiian Species of Diospyros

- A. Back of calyx glabrous, but the acute lobes ciliate; blades above with deep pits between the raised reticulate veinlets; blades mostly oblongelliptic, the base rounded to subcordate. Kauai, Oahu.  
..... D. Hillebrandii.

- A. Back of calyx appressed pilosulous,
- B. Blades above with deep pits between the raised reticulate veinlets; blades lanceolate,
  - C. Petioles pilosulous; blades 3.5-9 cm long.  
Oahu. D. sandwicensis, var. Toppingii.
  - C. Petioles arachnoid; blades 6-8.5 cm long.  
Kauai. . . . . var. rugosa.
- B. Upper surface of blade plane or nearly so; the veinlets obscure or faintly reticulate,
  - D. Blades below permanently pubescent,
    - E. Blades glabrous above, lanceolate to elliptic, 1.2-1.3 x 1-1.7 cm; petioles ascending puberulous. Molokai. var. sclerophylla.
    - E. Blades above appressed strigose to subglabrate, elliptic, 3.5-7.5 cm long; petioles puberulent and arachnoid.  
e. Maui, Lanai. . . . . var. Degeneri.
  - D. Blades below glabrous or early glabrous,
    - F. Petioles glabrous,
      - G. Blades lanceolate, (3-) 5-7 (-9.5) cm. long. Oahu. . . . var. sandwicensis.
      - G. Blades elliptic or ovate,
        - H. Blades elliptic, (5-) 6-11 cm long.  
Oahu, w. Maui. . . . var. elliptica.
        - H. Blades ovate, 4-7 cm long. Molokai,  
w. Maui. . . . . var. ovalis.
    - F. Petioles pubescent,
      - I. Petioles white arachnoid,  
J. Petioles only arachnoid,  
K. Blades elliptic or lanceolate,  
L. Blades elliptic,  
M. Blades 6-11 cm long,  
N. Blade base rounded; blades 4.7-8.2 cm long. Oahu.  
. . . . . var. ohauensis.
      - N. Blade base subcordate; blades 6-12 x 4.7-8.2 cm, Kauai.  
. . . . . var. kauaiensis.
      - M. Blades 2.5-5.5 cm long,  
O. Blades 10-32 mm wide, elliptic.  
Molokai, Lanai. var. arachnoidea.
      - O. Blades 32-40 mm wide, broadely elliptic. Lanai. var. lanaiensis.
      - L. Blades lance elliptic, 3-5.5 cm long.  
Hawaii. . . . . var. frameata.
      - K. Blades lanceolate, 3-8 cm long. Kauai,  
Oahu, Hawaii. . . . var. rotundata.
    - J. Petioles arachnoid and pubescent,  
P. Blades elliptic to ovate, 2.5-12 cm long. Molokai, Hawaii. var. pubescens.
    - P. Blades lanceolate, 7-12 cm long.  
Kauai. . . . . var. kokeensis.

- I. Petioles pubescent, but not arachnoid,
- Q. Blades lanceolate, 3-9 cm long. Kauai,  
Oahu, Molokai, Hawaii. var. Wiebkei.
- Q. Blades elliptic,
  - R. petioles appressed pubescent,
  - S. Petioles appressed puberulous,
    - T. Petioles sparsely minutely puberulous; blades 4-6 cm long.  
Hawaii. var. puberula.
    - T. Petioles densely puberulent;  
blades 6.5-11 cm long.  
Kauai. . . var. miloliiensis.
    - S. Petioles appressed pilose; blades  
2-5.5 cm long, elliptic, obtuse.  
Oahu. . . . . var. obtusa.
  - R. Petioles diverging pubescent,
    - U. Petioles spreading puberulous;  
blades appressed pilosulous below,  
(1.7-) 3-5.5 cm long, elliptic or  
lance elliptic. Molokai.  
. . . . . var. wailauensis.
    - U. Petioles densely ascending puberulent;  
blades glabrate below, 3-4 cm long,  
elliptic. Molokai, Hawaii.  
. . . . . var. perpubescens.

#### Enumeration of Taxa

- Diospyros sandwicensis* (A. DC.) Fosb., var. sandwicensis, Bishop Mus., Occas. Papers 12(15): 8, 1936.
- D. ferrea* (Willd.) Bakh. Gard. Bull., Straits Settlem. 7: 162, 1932, var. sandwicensis (A. DC.) Bakh., Jard. Bot. Buitenz., Bull. III, 15: 58. 1937.
- D. ferrea*, var. sandwicensis, f. sandwicensis (A. DC.)

Fosb., Bishop Mus., Occas. Papers 15(10): 125, 1939.  
*Maba sandwicensis* A. DC. in DC., Prodr. 6:242, 1844.

*Ebenus sandwicensis* (A. DC.) Ktze., Rev. Gen. 2:  
408, 1841. Fog/ SW

Holotype: in insul. Sandwich, Gaudichaud (P).  
Range: Oahu.

var. arachnoidea, var. nov.

Diagnosis Holotype: Petiolis arachnoideis, laminis  
ellipticis glabratiss.

Diagnosis of Holotype: Tree 6.6 m tall; petioles  
white arachnoid; blades 2-5.5 x 2.1-2.9 cm, coriac-  
eous, elliptic, early glabrate above and below;

peduncles 3-4 mm long, ascending pilose; calyx 4-5 mm long, patelliform, appressed ascending pilose, the lobes convex; fruit 10-13 mm long, broadly ellipsoid.

Supplementary Description: Tree 3-7 m tall; blades 2-7 cm long; fruit yellow, becoming red.

Holotypus: Hawaiian Islands, Oahu Island, Waianae Mts., Makua, Piko Trail, wooded gulch, Nov. 25, 1932, H. St. John 12,249 (BISH).

Specimens Examined: Oahu, both mountain ranges, 10 collections. Molokai: Mahana, Rock 14,004. Lanai: St. John & Cowan 22,620, and seven others. Hawaii: Kapua, E. H. Bryan Jr. 750, and one other.

Discussion: The new epithet is the Latin adjective arachnoideus, cobwebby, and it is chosen with reference to the pubescence of the petioles.

Range: Oahu, Molokai, Lanai, and Hawaii.

var. Degeneri (Fosb.) comb. nov. Fig. 4r.

D. ferrea (Willd.) Bakh., var. Degeneri Fosb., Bishop Mus., Occas. Papers 15(10):129-130, 1939.

Lectotype: Hawaiian Islands, East Maui, Auahi, alt. 3,000 ft, Nov. 1910, Rock 8,665a (BISH). Fosberg listed this and another number as the type.

var. elliptica var. nov. Fig. 3p

Diagnosis Holotypi: Petiolis glabris, laminis 6-11 X 2-5.7 cm ellipticis glabris.

Diagnosis of Holotype: Small tree; petioles glabrous; blades 6-11 X 2-3.2 cm, coriaceous, elliptic, glabrous; pedicels 3-4 mm long, ascending pilose; calyx 4-5 mm long, ascending pilose, the lobes hemispheric; fruit 14-19 mm long, ellipsoid.

Supplementary Description: Tree 2-12 m tall; blades 2-5.7 cm wide.

Holotypus: Hawaiian Islands, Oahu Island, Punaluu, 1,900 ft alt., Nov. 30, 1929, H. St. John 10,079 (BISH).

Specimens Examined: Oahu, both mountain ranges, 19 collections.

Discussion: The new epithet is the Latin adjective ellipticus, elliptic, and it is given with reference to the shape of the blades.

Range: Oahu.

var. frameata var. nov. Fig. 3m.

Diagnosis Holotypi: Arbor, ramulis petiolis basibus laminarum arachnoideis puberulisque, laminis 3-5.5 X 1.7-2.3 cm lanceo-ellipticis planis.

Diagnosis of Holotype: Tree; branchlets and petioles arachnoid and spreading puberulous; petioles 4-6 mm long, arachnoid; blades 3-5.5 X 1.7-2.3 cm, coriaceous,

lance elliptic, plane, arachnoid near the base on both sides; peduncles 1-2 mm long, ascending pilose; calyx 4-5 mm long, appressed ascending pubescent, the lobes 2 mm long, broadly deltoid; fruit 14-16 mm long, ellipsoid.

Supplementary Description: Tree 3-8 m tall; blades 1.7-2.6 cm wide.

Holotypus: Hawaiian Islands, Hawaii Island, Manuka, Kau, 9-1927, G. W. Russ (BISH).

Specimens Examined: Hawaiian Islands, Hawaii Island, Kapua, on pahoehoe, kipuka s. of Hanakeaumoe, near the sea, Nov. 28, 1932, E. H. Bryan Jr. 762; N. Kona, just s. of 1801 lava flow, 1,000 ft elev., July 31, 1966, S. Carlquist 2,101; Puuwaawaa, rough lava, 600 m alt., Dec. 2, 1926, L. H. MacDaniels 319; all in (BISH).

Discussion: The new epithet is from the Latin noun *framea*, spear, and it is given with reference to the spear or lance-shaped blades.

Range: Hawaii.

var. *kauaiensis* (Fosb.) comb. nov. Fig. 4v.

D. ferrea (Willd.) Bakh., var. *kauaiensis* Fosb., Bishop Mus., Occas. Papers 15(10) 130-131, 1939.

Holotype: Hawaiian Islands, Kauai, Waimea, Keana-mahuna Valley, 2,500 ft alt., Oct. 31, 1929, C. S. Judd (BISH).

Range: western Kauai, Kaholuamanu; Kukui Trail; Milolii; and Mahanloa, four collections.

var. *kokeeensis* var. nov. Fig. 2i.

Diagnosis Holotypi: Arbor, ramulis petiolisque arachnodeis, laminis 4-8.5 × 1.1-3.5 cm lanceolatis glabris coriaceis.

Diagnosis of Holotype: Tree; branchlets arachnoid; petioles 5-6 mm long, arachnoid; blades 4-8.5 × 1.1-3.5 cm, coriaceous, lanceolate, glabrous except that the midrib is arachnoid near the base; (branch sterile).

Holotypus: Hawaiian Islands, Kauai Island, w. of Kokee, Dec. 1960, Hans Hansen (Degener no.) 27,225 (BISH).

Discussion: The new epithet is formed from the name of the type locality, Kokee, and *-ensis*, the Latin adjectival place ending.

var. *lanaiensis* (Fosb.) comb. nov. Fig. 4q.

D. ferrea (Willd.) Bakh., var. *Degeneri* Fosb., f. *lanaiensis* Fosb., Bishop Mus., Occas. Papers 15(10): 130, 1939.

Holotype: Hawaiian Islands, Lanai Island, mountains near Koele, June 1913, C. N. Forbes 118.L. (BISH).

Specimens Examined: Hawaiian Islands, Lanai Island, edge of Maunalei, Sept. 1917, Forbes 376.L.; and eight others. Range: Lanai, dry scrub or forest, 1,000-2,000 ft alt., Kanepuu, and the mountain Lanaihale.

*var. miloliiensis* var. nov.

Fig. 1c.

Diagnosis Holotypi: Arbor 5 m alta est, ramulis petiolisque dense ascendentem puberulis, laminis 6.5-11  $\times$  2.5-5 cm ellipticis glabratiss supra moderatim reticulatis.

Diagnosis of Holotype: Tree 5 m tall; branchlets and petioles densely ascending puberulent; petioles 7-10 mm long; blades 6.5-11  $\times$  2.5-5 cm, coriaceous, abundantly appressed puberulous but glabrate, elliptic, above moderately reticulate; pedicels 2-3 mm long, scaly and pilose; calyx 5-6 mm long, appressed pilose, the lobes 2.5-3 mm long, broadly ovate; corolla 8 mm long.

Holotypus: Hawaiian Islands, Kauai Island, Waimea Dist., Mahanloa Valley, dry forest, 2,000 ft elev., May 25, 1980, R. Gustafson 1,755 (BISH).

*var. oahuensis* var. nov.

Fig. 3o.

Diagnosis Holotypi: Arbor est, ramulis petiolisque dense arachnoideis, laminis 4-9.3  $\times$  2.9-4.6 cm ellipticis subacutis.

Diagnosis of Holotype: Tree; branchlets and petioles densely white arachnoid; petioles 4-7 mm long; blades 4-9.3  $\times$  2.9-4.6 cm coriaceous, elliptic, subacute, the base rounded, plane; calyx 3.5-4 mm long, appressed pilosulous, the lobes broadly ovate, subacute.

Holotypus: Hawaiian Islands, Oahu Island, n. side of Kaluanui Valley, moderately rainy forest, March 18, 1939, O. Degener & Foster 12,303 (BISH).

Discussion: The new epithet is the name of the type locality, and *-ensis*, the Latin adjectival place suffix.

*var. obtusa* (Fosb.) comb. nov.

Fig. 1d.

D. ferrea (Willd.) Bakh., var. sandwicensis (A. DC.) Bakh., f. obtusa Fosb., Bishop Mus., Occas. Papers 15(10: 127, 1939).

Holotype: Hawaiian Islands, Oahu Island, Koolau Mts. divide, Pupukea-Kahuku Trail, Hanakaoe, moist forest, 450 m alt., May 31, 1937, F. R. Fosberg & E. Y. Hosaka 14,000 (BISH).

Specimens Examined: Hawaiian Islands, Oahu Island, Laie-Malaekahana ridge, lower woods, 1,100 ft alt., April 15, 1933, H. St. John 13,053 - and 23 others.

Range: Oahu, lower slopes of the Koolau Range.

var. *ovalis* var. nov.

*Diagnosis Holotypi:* Arbor 6.6 m alta est, ramulis foliisque glabris, laminis 5-6.5  $\times$  2.3-3.4 cm coriaceis ovatis varie elliptico-ovatis.

*Diagnosis of Holotype:* Tree 6.6 m tall; branchlets and petioles glabrous; petioles 3-5 mm long; blades 5-6.5  $\times$  2.3-3.4 cm, coriaceous, ovate to elliptic ovate, plane, glabrous; pedicels 2-3 mm long, scaly and pilosulous; calyx 4 mm long, appressed pilose, the lobes broadly deltoid to suborbicular; fruit 11-13 mm long, ellipsoid.

*Expanded Description:* Blades 5-7  $\times$  2.3-3.7 cm.

*Holotypus:* Hawaiian Islands, Molokai Island, n. of Halawa Valley, shrubby forest, Aug. 1, 1949, O. Degener & T. Murashige 20,118 (BISH).

*Specimens Examined:* Hawaiian Islands, Molokai Island, Halawa, dry rocky slope, 250 ft alt., Dec. 27, 1932, H. St. John et al. 12,715; and 2 others.

Maui: between Nahiku and Hana, old aa flow, July 4, 1961, O. & I. Degener 27,604.

*Range:* Molokai and Maui, lower forests.

The new epithet is the Latin adjective *ovalis*, egg-shaped, and it refers to the shape of the leaf blades.

var. *perpubescens* var. nov.

Fig. 2h.

*Diagnosis Holotypi:* Arbor est, ramulis petiolisque ascendentibus puberulis, laminis 5-7.5  $\times$  2-3.1 cm ellipticis subacutis glabratibus.

*Diagnosis of Holotype:* Tree 3-5 m tall; branchlets and petioles densely ascending puberulent; petioles 3-6 mm long; blades 5-7.5  $\times$  2-3.1 cm, coriaceous, elliptic, subacute, plane, at first appressed puberulent but glabrate; pedicels 2 mm long, scaly and pilosulous; calyx 4 mm long, appressed pilosulous, the lobes hemispheric; fruit 11-14 mm long, ellipsoid.

*Expanded Description:* Blades 2-3.3 cm. wide.

*Holotypus:* Hawaiian Islands, Hawaii Island, Punaluu, rocky pasture, July 25, 1926, O. Degener 30,201 (BISH).

*Specimens Examined:* Hawaii Island: Puuwaawaa, 1/2 mile mauka of Mamalahoa Hwy., dry forest, 1,950 ft elev., 6 Feb. 1972, G. Spence 22; and 5 others.

Molokai Island: Makakupaia, dry forehill gulch, Degener & Pekelo 27,598.

*Range:* Molokai and Hawaii, dry scrub forests.

var. *pubescens* (Skottsb.) comb. nov. Fig. 4u.  
*Maba sandwicensis* A. DC., var. *pubescens* Skottsb.,

Göteborgs Bot. Trädg., Meddel. 2: 257, 1926.

*Diopyros ferrea* (Willd.) Bakh., subsp. *sandwicensis* (A. DC.) Fosb., Bishop Mus., Occas. Papers 15(10): 128, 1939. ↑ var. *pubescens* (Skottsb.) Fosb.,

Maba sandwicensis A. DC., var.  $\beta$  Hbd., Fl. Haw. Is.  
275, 1888.

Skottsberg based his Maba sandwicensis, var. pubescens on Hillebrand's var.  $\beta$ , and on two of his own collections from Hawaii, without designating a type. Fosberg (1939: 128) stated, "Hillebrand included plants from Kauai and Hawaii in this variety, but when Skottsberg gave it a name he cited only Hawaii specimens. Though he did not definitely reject the inclusion of the Kauai forms, I think he typified the variety by this limitation."

Hillebrand cited his var.  $\beta$  from Hawaii: Kona and Kau; Kauai, Waimea, and gave different petiole and blade measurements for the plants of each island. Thus it is seen that Hillebrand had two Hawaiian localities.

Hillebrand's first set of specimens was destroyed in Berlin in 1944, however, there is a Hillebrand duplicate of var. Pubescens in the Bishop Museum, and it consists of detached fruit and numerous leaves, and the original ticket reads, "Maba, Kau, Haw." [aai]. This might be an isotype, except for the fact that the leaves are of two sorts, so different that they probably were from two different collections. One sort was surely from Kau, and the other was probably from Kona, but which came from which area is uncertain. Fosberg did not specify any definite Hawaiian collection, so his typification is vague, and unsatisfactory. There is no Hillebrand specimen of this plant in the British Museum or in Melbourne. Hence, the surviving Hillebrand specimens are in a state of confusion. To settle the problem, the following specimen, cited by Skottsberg, is here chosen as the lectotype of var. pubescens Skottsberg.

Lectotype: Hawaiian Islands, Hawaii Island, Kau, between Pahala and Naalehu, 21/9/1922, C. Skottsberg 605b (BISH).

Specimens Examined: Hawaiian Islands, Hawaii Island, North Kona, Flow of 1859, dry aa flow, 8-8-1936, F. R. Fosberg 42; Manuka Mauka, wooded kipuka, 1,300 ft elev., Dec. 26, 1931, H. St. John et al. 11,331; and 33 others.

Molokai: Punakou, Waiahewahewa Gulch, under Nesoluma, Erythrina, 450 ft elev., 5 April 1973, D. Herbst 2,973. Range: Hawaii Island, 600-2,300 ft alt., in dry lower forests, Puna, Kau, South Kona, and North Kona Districts, and on Molokai, on Mauna Loa at 450 ft alt.

var, rotundata var. nov.

Fig. 2f.

Diagnosis Holotypi: Arbor 8.3 m alta est, ramulis petiolisque arachnoideis, petiolis 5-7 mm longis, laminis 5-7 x 2-3 cm glabris lanceolatis.

Diagnosis of Holotype: Tree 8.3 m tall; branchlets and petioles arachnoid; petioles 5-7 mm long; blades

$5-7 \times 2-3$  cm, coriaceous, glabrous, lanceolate; pedicels 3-4 mm long, scaly and pilose; calyx 4-5 mm long, the lobes 3 mm long, hemispheric, acute, appressed pilose; fruits 15-18 mm long, obovoid.

Expanded Description: Blades 2.7-8  $\times$  1.2-3.5 cm, lanceolate to elliptic lanceolate.

Holotypus: Hawaiian Islands, Oahu Island, Niu Ridge, wooded hillside, Dec. 3, 1933, Bush & Topping (Degener no.) 3.700 (BISH).

Specimens Examined: Hawaiian Islands, Oahu Island, Koolau Range, Waimano, 1944, C. Wong 240; and 6 others.

Kauai: Napali Coast, w. side of Hanakoa Valley, moist lower forest, 500 ft alt., Dec. 31, 1947, H. St. John & E. J. Britten 23,223; and 2 others.

Maui: Hanakao Gulch, near Lahaina, scrubby slope, 2,000 ft alt., Nov. 27, 1950, O. Degener & H. A. Miller 21,130; and 5 others.

Range: Kauai, Oahu, and Maui, in lower forests.

var. *rugosa* var. nov.

Fig. 2j.

Diagnosis Holotypi: Arbor est, ramulis petiolisque arachnoideis, petiolis 4-7 mm longis, laminis 6-8.5  $\times$  1.9-2.7 cm reticulatis glabris lanceolatis.

Diagnosis of Holotype: Tree; branchlets and petioles arachnoid; petioles 4-7 mm long; blades 6-8.5  $\times$  1.9-2.7 cm, coriaceous, reticulate above and below, glabrous, lanceolate; pedicels 3 mm long, scaly and pilosulous; calyx 5 mm long, appressed pilose, the lobes 2.5 mm long, broadly ovate deltoid; fruit 14 mm long, ellipsoid.

Holotypus: Hawaiian Islands, Kauai Island, 3/4 mile s. w. of Hokunui, dryish grassy summit ridge, Jan. 8, 1940, O. Degener & E. Ornonez 12,637 (BISH).

var. *sclerophylla* (Fosb.) comb. nov.

Fig. 4s.

D. ferrea (Willd.) Bakh., var. pubescens (Skottsb.)

Fosb., f. sclerophylla Fosb., Bishop Mus., Occas.

Papers 15(10): 129, 1939.

Holotype: Hawaiian Islands, Molokai Island, Mauna Loa, June 1912, C. N. Forbes 6.Mo. (BISH), and isotype.

Specimens Examined: Molokai Island, near Waiahewa-hewa, arid region, April 19, 1928, O. Degener 11,998; and 2 others.

Range: Molokai, arid western part.

var. *Toppingii* (Fosb.) comb. nov.

Fig. 1b.

D. ferrea (Willd.) Bakh., var. Toppingii Fosb.,

Bishop Mus., Occas. Papers 15(10): 129, 1939.

Holotype: Hawaiian Islands, Oahu Island, Waianae Mts., Nanakuli, Bush & Topping (Degener no) 11,134

(NY). Isotypes (BISH).

Specimens Examined: Hawaiian Islands, Oahu Island, two ridges s. of Pohakea Pass, forest, 500-750 m alt., 19 March 1931, E. Christophersen, Wilder & Hume 1,660; and 6 others, all from the Waianae Mts.

var. wailauensis (Fosb.) comb. nov. Fig. 3n.

D. ferrea (Willd.) Bakh., var. sandwicensis (A. DC.) Bakh., f. wailauensis Fosb., Bishop Mus., Occas. Papers 15(10): 128, 1939.

Holotype: Hawaiian Islands, Molokai Island, pali above peninsula w. of Wailau Valley, 150 m alt., 7-4-1933, F. R. Fosberg 9,658 (BISH).

Specimens Examined: Hawaiian Islands, Molokai Island, upper Waiahewahewa Gulch, 1,000 ft alt., 2/9/73, N. Pekelo Jr. 25; and 3 others.

Maui Island: Olowalu Valley, May 23, 1920, C. N. Forbes 2,480.M.

Range: Molokai and west Maui, lower dry forests.

var. Wiebkei (Fosb.) comb. nov.

Fig. 31.

D. ferrea (Willd.) Bakh., var. kauaiensis Fosb., f. Wiebkei Fosb., Bishop Mus., Occas. Papers 15(10): 131, 1939.

D. ferrea, var. sandwicensis (A. DC.) Bakh., f. ovata Fosb., Bishop Mus., Occas. Papers 15(10): 127, 1939.

D. ferrea, var. sandwicensis, f. subcoriacea Fosb., Bishop Mus., Occas. Papers 15(10): 127, 1939.

Holotype: Hawaiian Islands, Kauai Island, n. e. of Kipukai, dark moist woods, June 17, 1926, O. Degener & H. Wiebke 3,234 (NY). Isotype (BISH).

Kauai: ridge 3/4 mile n. of Laaukahia, Koloa, open forest, 850 ft alt., Dec. 24, 1947, H. St. John et al. 23,009; and 1 other.

Oahu: Manoa Cliff Trail, July 24, 1953, G. Pearsall; and 1 other.

Molokai: Wailau Valley, 400 ft alt., July 3, 1933, H. St. John et al. 13,233; and 1 other.

Hawaii: Puuwaawaa, 11-30-1926, L. H. MacDaniels; and 20 others.

Range: Kauai, abundant; scarce on Oahu and Molokai, and abundant on Hawaii.

When not otherwise assigned, all specimens are in (BISH).

var. *puberula* var. nov. Fig. 5x

Diagnosis Holotypi: Arbor est, ramulis petiolisque sparse adpresso puberulis, petiolis 2-4 mm longis, laminae 2.7-5 X 1.5-2.2 cm coriaceis ellipticis vel lancei-ellipticis obtusis supra glabris infra adpresso puberulis.

Diagnosis of Holotype: Tree; branchlets and petioles sparsely minutely appressed puberulous; petioles 3-4 mm long; blades 2.7-5 X 1.5-2.2 cm, elliptic or lance-elliptic, obtuse, coriaceous, above glabrous, below appressed puberulous petioles 2-3 mm long, ascending puberulent; calyx 4 mm long, ascending puberulous, the lobes 2 mm long.

Holotypus: Hawaiian Islands, Hawaii Island, Pololu Valley, open forest, Feb. 19, 1952, O. Degener & A. Greenwell 21,894 (BISH).

Specimens Examined: Same locality, Degener & Wiebke 3,227; and two others.

*Diospyros Hillebrandii* (Seem.) Fosb., Bishop Mus., Occas. Papers 12(15): 9, 1936. Fig. 1a.

Maba Hillebrandii Seem., Fl. Viti. 151, 1866, holotype.

Ebenus Hillebrandii (Seem.) Kuntze, Rev. Gen. 408, 1891.

Holotype: Hawaiian Islands, Oahu, Dr. Hillebrand 274 (K). Isotype: Hawaiian Islands, Oahu, valley of Niu, Hillebrand (BISH).

Description: Tree; branches glabrous; leaves distichous; petioles 2-5 mm long, glabrous; blades 5.5-15 X 2.5-7 cm, coriaceous, glabrous, usually elliptic, rarely lanceolate, obtuse or subacute, smooth; bracts and calyx glabrous, coriaceous; calyx 3-lobed, the lobes broadly triangular, acute; corolla 7 mm long; stamens 9; fruit 18-24 mm long, obovoid, hairy only at the apex.

Range: Oahu, common in both mountain ranges.



Fig. 1

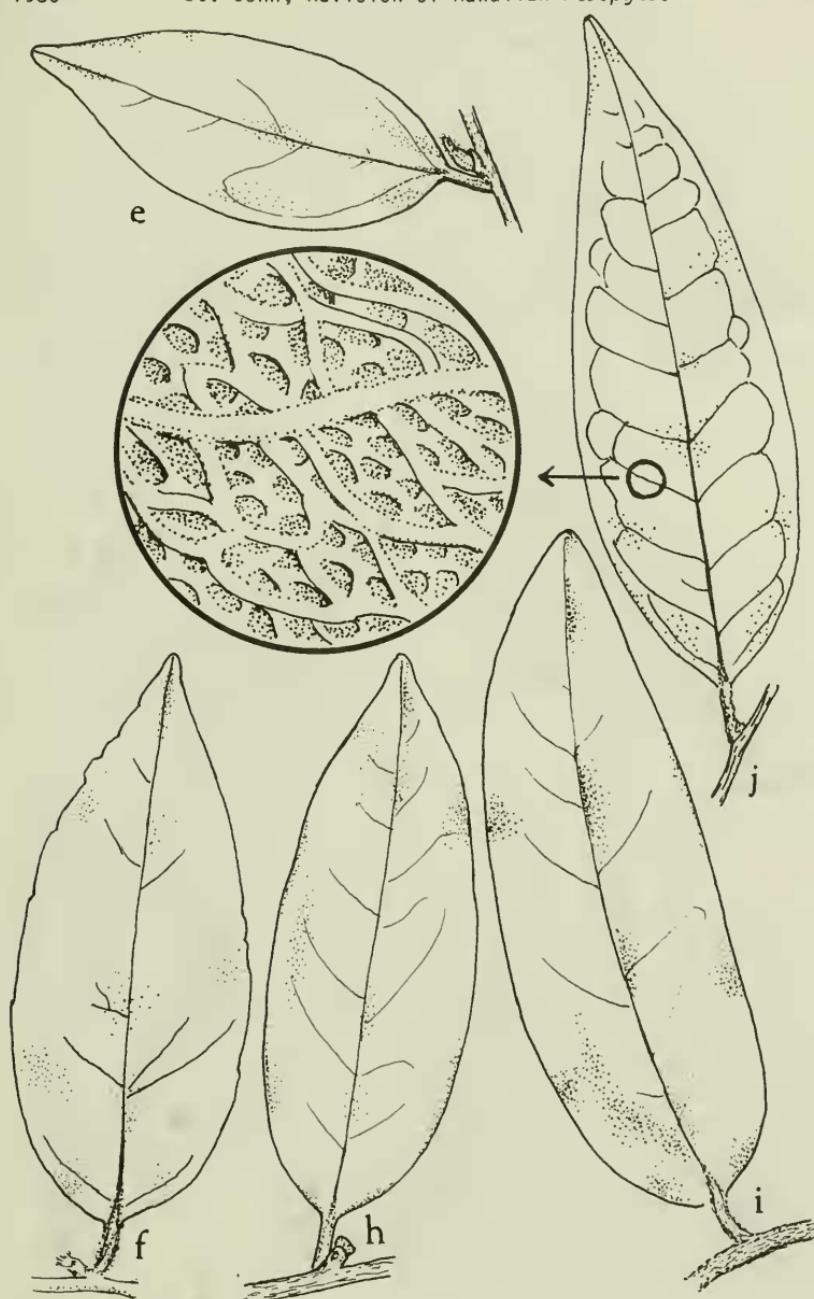


Fig. 2

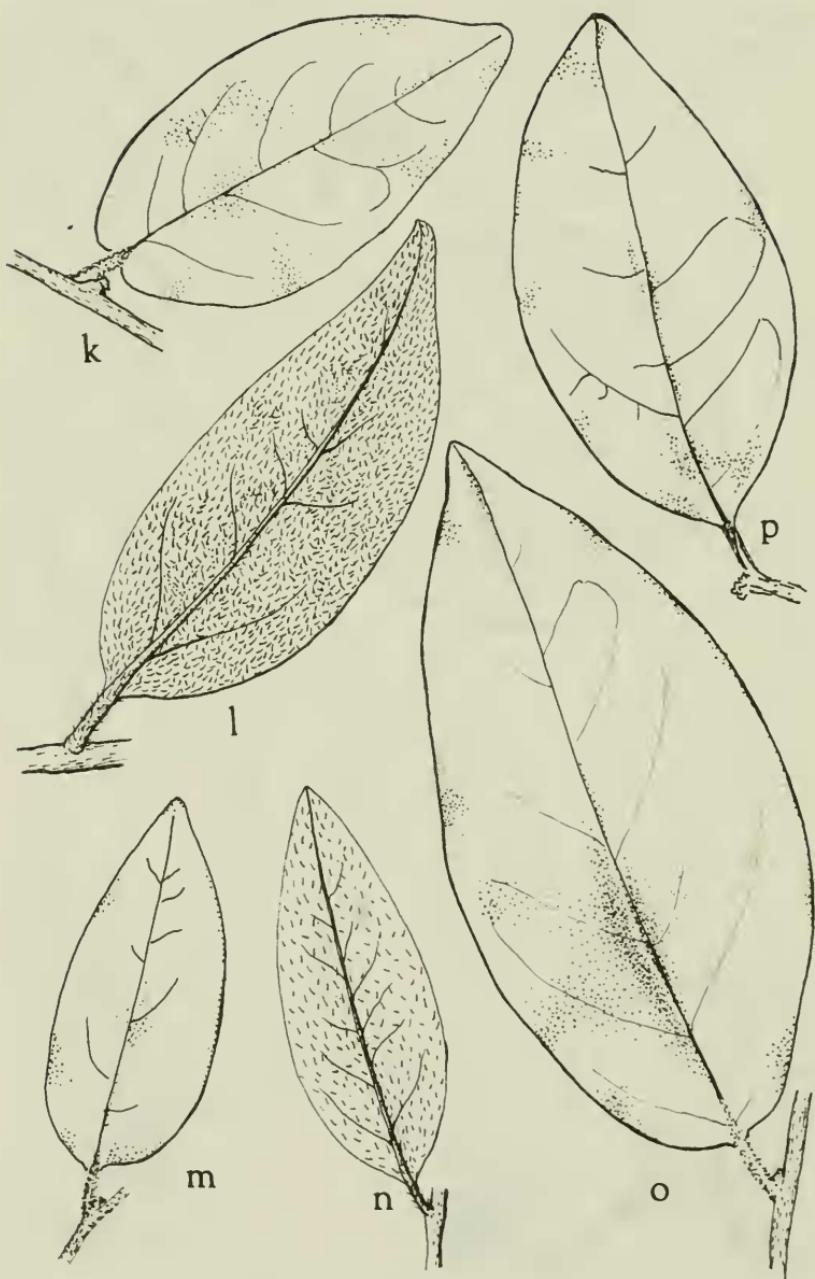


Fig. 3

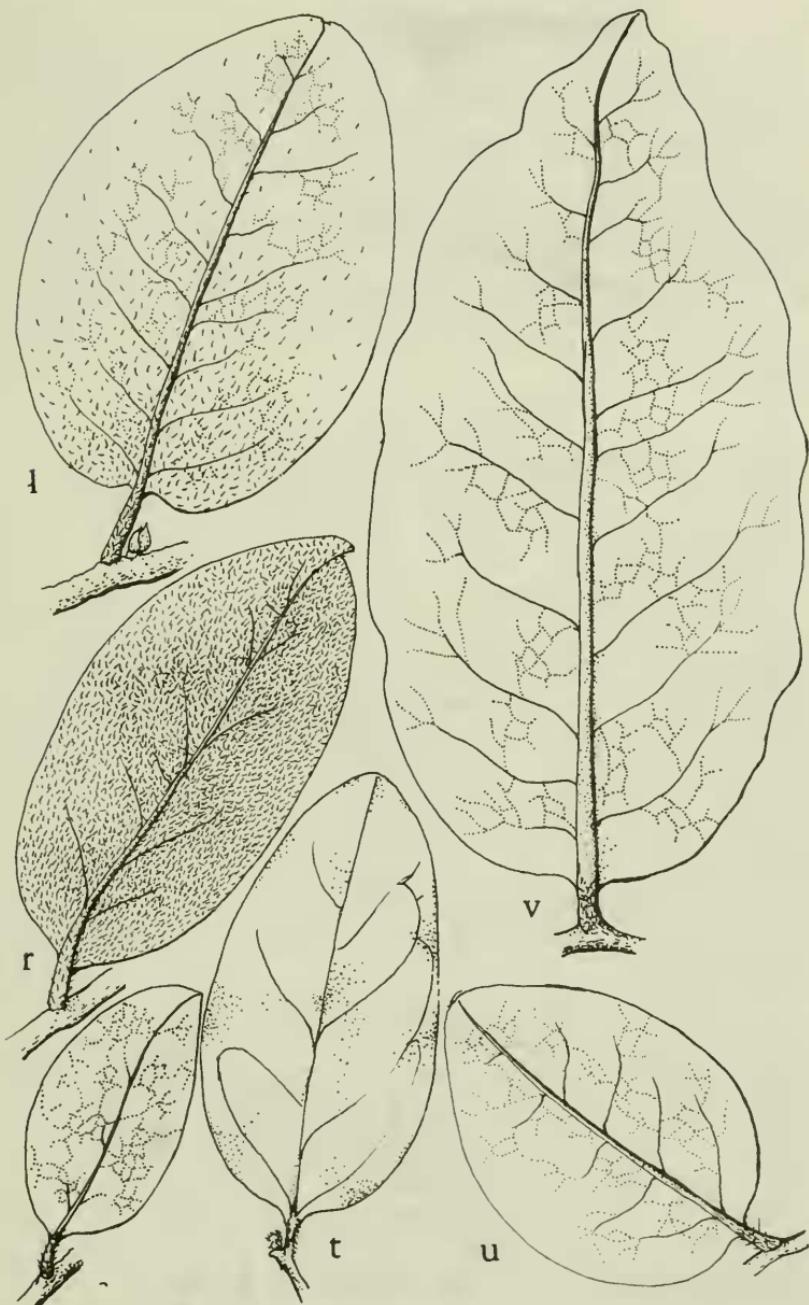


Fig. 4

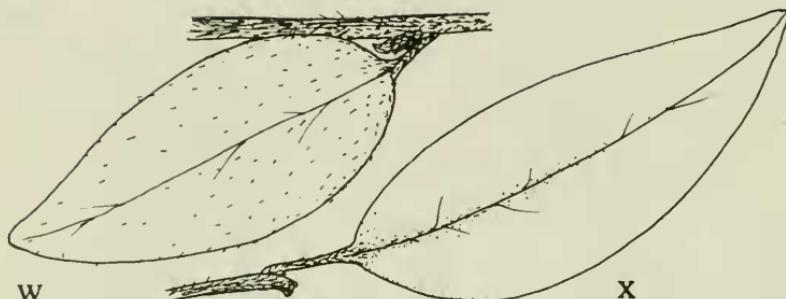


Fig. 5.

## Legend

Fig. 1. a *Disopyros Hillebrandii*, from Herat 470, Pamole; b, *D. sandwicensis*, var. Toppingii, from type; c, var. miloliensis, from type; d, var. obtusa, from type.

Fig. 2. e, *D. sandwicensis*, var. puberula, from type; f, var. rotundata, from type; g h, var. perpubescens, from type; i, var. Kokeensis, from type; j, var. rugosa, from type.

Fig. 3. k, *D. sandwicensis*, var. ovalis from type; l, var. Wiebkei, from type. m, var. frameata, from type; n, var. wailauensis, from type; o, var. oahuensis, from type; p, var. elliptic, from type.

Fig. 4. q, *D. sandwicensis*, var. lanaiensis, from type; r, var. Degeneri, from lectotype; s, var. sclerophylla, from type; t, var. arachnoidea, from type; u, var. pubescens, from lectotype; v, var. kauaiensis, from type.

Fig. 5. w, *D. sandwicensis*, var. puberula, from type; x, var. sabdwucebsus, from Fosberg 9,689, Manoa.

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